2004

The Discursive Divide: Women in the IT Industry

Sue H. Nielsen
Griffith University, s.nielsen@griffith.edu.au

Liisa A. von Hellens
Griffith University, l.vonhellens@griffith.edu.au

Jenine P. Beekhuyzen
Griffith University, j.beekhuyzen@griffith.edu.au

THE DISCURSIVE DIVIDE: WOMEN IN THE IT INDUSTRY

Nielsen, Sue H., Griffith University, 170 Kessels Road, Nathan, Brisbane, Australia, s.nielsen@griffith.edu.au

von Hellens, Liisa A., Griffith University, Brisbane, 170 Kessels Road, Nathan, Australia, l.vonhellens@griffith.edu.au

Beekhuyzen, Jenine P., Griffith University, Brisbane, 170 Kessels Road, Nathan, Australia, j.beekhuyzen@griffith.edu.au

Abstract

The complex problem of declining female participation in the IT industry has been conceptualised in a number of vivid images – the shrinking pipeline, the pink collar work force and the digital divide. This paper argues that women working in IT are discursively divided from the 'masculine' domain of IT and from other women by distinctive discursive practices. This paper discusses the use of discourse analysis to examine the interview data from a recent study of professional women in the IT industry, focusing on the way that such discourse constitutes the industry and supports gendered divisions in work and education. The paper explains the text-oriented approach to discourse analysis and how interpretation of the interview discourse is carried out, particularly in relation to the notion of denotation. Specifically, the discourse reveals dualisms in the women's discourse on IT work, which act as interpretive schemes but which also create a divide between 'female' and 'male' attitudes, attributes and skills. It is acknowledged that everyday talk routinely comprises contradictory themes, reflecting participants' need to make sense of routine activities and to resolve dilemmas in their sense of identity. However, this paper argues that the identification of such contradictions can contribute to our understanding of the digital divide, which exists between men and women in the IT industry.

Keywords: women in IT, discourse analysis, structuration theory

1 INTRODUCTION

The declining participation of women in IT education and professional work is now a well-documented research area, but the causes and remedies remain puzzling and complex. In other traditionally male-dominated professions of science, engineering and medicine, there have been small, but noticeable increases, there has not been a corresponding trend in the information technology sector.

A number of vivid metaphors have been used to encapsulate this situation; the pink-collar workforce, the glass ceiling and the shrinking pipeline. Camp (1997) used this latter phrase to refer to the small and declining number of women who continue IT related studies after leaving school and the continuing decline through post-graduate studies and academic appointments. Other studies have indicated that the pipeline shrinks even earlier, in the years between junior and senior high school (for example, Meredyth et al, 1999) when girls' interest and confidence in the use of computers declines markedly. In this paper we argue that discursive practices, which we call dualisms, contribute to these gendered divisions and that these practices simplify and misrepresent the complexity of female participation in the IT industry. These dualisms include analysis/intuition, soft/hard skills and business/technical perspective.

A lack of clarity as to what constitutes the IT industry and the rapid rate of change complicate attempts to understand the reasons for the declining participation. A related issue is the declining interest in IT degrees. This is despite the fact that IT salaries compare well with other professional salaries and are superior to most traditional female occupations (Megalogenis, 2003). The fact that many people enter the IT workforce via other qualifications indicates that traditional IT education is not very successful in attracting either the quantity or quality of students required to meet workforce needs.

To deal with this complexity, the Women in Information Technology (WinIT) research project, which commenced in 1995, has taken several perspectives, reflecting the multidimensional nature of the problem (von Hellens & Nielsen, 2001). The project has surveyed and interviewed male and female high school students as well as undergraduate and postgraduate IT students. Interviews have been carried out with high school teachers, vocational guidance counsellors, IT academics and professionals in the IT industry. A complete list of published research may be found at http://www.cit.gu.edu.au/~jenine/WinITProject/.

This paper builds on earlier studies (Nielsen, von Hellens, Beekhuyzen & Trauth, 2003; Trauth, Nielsen & von Hellens, 2003; Pringle, von Hellens, Nielsen, Greenhill & Parfitt, 2000), which identified a number of ways which women use for coping with IT, given that the information society has not lived up to its early promise as a meritocracy which would provide a level playing field for all social groups (Kvasny & Trauth, 2003). We also discuss in more detail the use of discourse analysis to explore a set of interviews with women working in the IT industry and their perceptions of the necessary skills and attributes for success and satisfaction.

2 RESEARCH APPROACH

Research into gender and IT has taken two major approaches; that men and women are inherently different or that gender differences are primarily socially constructed. For example, Venkatesh, Morris and Ackerman (2000), and Venkatesh and Morris (2000) investigate gender differences in computer anxiety and aptitudes, concluding that these differences explain lower adoption rates by women. A similar approach is taken in studies of female students, which treat women as an undifferentiated category and focus on the psychological characteristics that restrict, rather than encourage, them to undertake IT studies (Brosnan & Davidson, 1996). Another stream of research within the inherent differences approach is represented by Spender (1995) who holds that increased female participation in the IT industry would transform and improve information technology design and use.

Our approach in the WinIT project views gender and technology as socially constructed and seeks to explore the masculinisation of the IT domain and the way that women cope with the social embededness of IT institutions. (von Hellens & Nielsen, 2001) This does not imply that women may be treated as an undifferentiated category. Recently Trauth (2002) discussed research, which critiques the social construction perspective (e.g. Wajcman, 1991) pointing out "there is no behaviour or meaning which is universally and cross-culturally associated with either masculinity or femininity" (2002, p.102). We have therefore adopted Giddens' structuration theory as a framework to focus the interpretation of the data. Halford and Leonard (2001) suggest that Giddens offers "considerable promise for the development of fuller understandings between gender, power and organisation" (p.32). In particular, we are interested in the formation of identity amongst women working in IT who have "stepped outside into social settings in which the only available identities were those offered by male stereotypes". (Giddens, 1991, p.216).

Within the information systems research discipline, there is a growing interest in using particular concepts from structuration theory (Jones, 1999), focusing primarily on the nature of technology and its relationship to human agents in information systems development and use. Our current research aims to extend this application to the problem of the relationships between the IT education and commercial industries, social perceptions of IT education and work and the human resource requirements of the IT industry. In this paper we analyse the interview data in terms of the concepts of dualisms, routinisation and interpretive schemes.

Since our data set consists entirely of interviews we have adopted Fairclough's (1992) text oriented approach to discourse analysis to explore the relationship between the female discourse and the wider institutional context of the IT industry. In proposing discourse analysis as a method for studying social change, Fairclough suggests "it is necessary to draw together methods for analysing language within linguistics and language studies, and social and political thought" (1992, p.1). Amongst the latter he includes the work of Giddens, Foucault and Habermas, to provide the wider social and institutional context. Fairclough is proposing that this will end the "isolation of language studies from other social sciences .... [as well as] the traditional lack of interest in language on the part of other social sciences and a tendency to see language as transparent" (1992, pp.1-2). Giddens also acknowledges the 'linguistic turn' in recent social science research and emphasises the prominence of language in identify formation and "the institutionalisation of collective experience" (1991, p23). Our research follows that tradition, now widely adopted in information systems research, and exemplified in the 2002 conference on "Global and Organizational Discourse about Information Technology". (Wynn et al., 2003) Fairclough's approach is discussed in section 4.

3 DATA COLLECTION AND ANALYSIS

This current study uses interviews conducted in 1999-2000 with thirty-two (32) female and two (2) male IT professionals working in technical areas of the Australian IT industry. The participants are *IT practitioners* working in a range of levels at a range of industry sectors and *academics* in IT faculties. The participants represent a range of ages, employment sectors, educational backgrounds and ethnic backgrounds. The males were interviewed primarily to provide insight into the female experience. The female subjects offered two perspectives on the topic; their experiences of entering and progressing in the IT field, and helping other women enter and succeed in IT.

The semi-structured open-ended interview style allowed interviewees to express their personal views and discuss their individual experiences in the Australian IT industry. Interview length was approximately 90 minutes with four main areas being covered; demographic information, personal history, general questions about gender and IT, and recommendations regarding how society, the IT profession and educational institutions might address the gender imbalance in IT (von Hellens & Nielsen, 2001). The interviewed women are not a random sample, they were identified as being active in Women in Information Technology associations and from a data base of women working in software engineering and systems development roles, whose companies had recently participated in

software quality assessments. These women are both the subjects of our study and informed observers of the skills issues faced by women in the industry.

Data analysis began through the initial sorting and coding of the interview data. This process was supported by NUD*IST, an Australian qualitative software application. NUD*IST is an acronym for Non-numerical Unstructured Data, Indexing, Searching and Theorising (QSR, 1997). The software allows the researcher to connect a 'term' and a 'concept' which allows for enriched indexing and takes into account that expressions cannot be taken at face value, and must be related to their context (Klein & Myers, 1999). These concepts are decided iteratively by reference to all dimensions of the framework. The connotations of text are discussed in section 5. The systematic approach to indexing and searching has proved helpful and continues to support communication between the researchers.

Patton (1990) supports the use of computer assisted coding in certain situations. "When data are going to be used by several people, or when data are going to be used over a very long period of time, including additions to the data set over time, such a comprehensive and computerized system can be extremely useful and could actually save time in the long run" (p.384). Discussion of the use of the software in this project can be found in Beekhuyzen, Nielsen and von Hellens (2003).

After the initial coding of interview data at nodes, the data was searched manually for distinctive patterns of text, using methods from Fairclough's text oriented discourse analysis, as discussed below (Fairclough, 1992; 1997); in other words we looked for the meaning of discourse patterns within the context of the total data set and in relation to contextual factors. Significant contradictions/oppositions were found in the data, as detailed in the next section.

4 DISCOURSE ANALYSIS AND INTERPRETATION

Our framework for analysis is based on Fairclough's work (1992; 1997). This means that the particular instance of the text (phrase or longer quote) is related to the interview and the situational context, such as work, family, education and the subject's life history and interpreted accordingly. This interpretation relates to discursive practice in the larger data set revealing distinctive patterns in the discourse, such as dualisms. This interpretation takes into account the wider social and institutional context.

By text, we mean a particular instance of discourse, ranging from a short phrase to an extended answer to an interview question. This text is considered within its immediate discursive context, which for this research study is the entire interview. The interpretive focus widens by taking into account the situation, which the speaker is referring to, such as event in the workplace. We widen our focus further by then looking at the relationship of these elements to distinctive discursive practices across the whole data set, such as the use of metaphor. In this paper we explore dualisms as discursive practices, which create gendered dualisms in IT work, as in the dualism of soft and hard skills, which illustrates our interpretation. Our conceptualisation of texts as 'dualisms' is drawn not only from our examination of the interview data but also from our reference to the wider social and institutional context, sourced from our experiences, those of other women we have interviewed and indeed the research literature on women in IT. For this research study we have conceptualised this wider context, as socially constructed, using structuration theory as a metatheory to guide our interpretation of the meaning of the discourse.

The approach to discourse analysis used in this research belongs to the critical discourse analysis tradition (Fairclough, 1992; Kress, 1985) which views discourse as "systematically organised sets of statements which give expression to the meanings and values of an institution" (Kress, 1985, pp.6-7). Thus we were interested in uncovering not only what people say about their work but how they conceptualise this and how they feel about the institution of the IT industry. Perceptions of the IT industry are identified through the various 'discursive' practices or ways of talking. (Fairclough, 1992) They are similar to what Foucault (1969) calls 'discursive formations' defined as "a group of

statements in which it is possible to find a pattern of regularity in terms of order, correlation, position and function". (Macey, 2000, p.101)

The interpretative process follows an iterative route, similar to that of the hermeneutic circle. The notion of the 'hermeneutic circle' expresses the approach to interpretation, which requires an understanding of any part of the text within its whole context (Dilthey, 1976). Thus the generally understood meaning of particular words (as recorded in a dictionary) may take on a different meaning within a particular context. That meaning will also be modified within the perspective of another context. Thus the interpretative enterprise is never exhausted, and a better understanding of the meaning must be sought in an iterative, recursive manner.

As with all hermeneutic interpretation the interpretation of the text is dependent on the subjects that make the interpretation. Fairclough states "discourse analysis should best be regarded as a method for conducting research into questions which are defined outside it" (Fairclough, 1992, p.226). As discussed earlier we take this to mean that discourse analysis requires an epistemological perspective and body of theories relevant to the research question. Since we are exploring the reasons for the declining participation of women in IT from a social construction perspective – how the IT industry is constructed as a 'masculine' domain. We therefore adopted Giddens'structuration theory to explore the formation of and legitimation of the IT industry.

5 DENOTATION AND CONNOTATION

An important aspect of hermeneutic interpretation therefore is to not take texts at face value, but to consider whether the speaker/writer is being 'indirect'. This requires us to consider the notions of denotation, and connotation. The denotation of a word may be defined as the most literal meaning, usually as found in the dictionary. The connotation refers to all the associated meanings, which the listener/speaker may take from the text. Eco (1984) discusses connotation as the differing degrees of indirectness with which content is communicated, with denotative meaning being the most direct meaning. A simple example is the word 'bear' which denotes an animal but may connote other meanings such as an angry man or the state of the stock market, depending on the context. Hence the interpretive act may be viewed as an endeavour to discover all the relevant connotations of a text, and as mentioned above, this requires attention to the context – textual, situational, social, cultural, organisational and/or institutional. Deciding which of the connotations is most likely intended by the speaker/writer requires an understanding of the nature of the context, for example, the social institution of IT work.

We can consider the notion of denotation and connotation by reference to a small piece of text from one of the interviews, in which the subject discussed the need to "keep learning and you never stop." (*Cynthia, 332-8*; this is a pseudonym like all subject names). This denotes the need to continuously update technology skills; and it denotes continuous learning as illustrated in Figure 1. However, we can interpret this statement as connoting various perceptions of IT, preferred work patterns, and harassment.

Interpretation requires reference to other statements made in the interview, as well as the current context of IT work. In this case, repeated expressions of discursive practice of this type enabled us to consider the dualism of work and family in the modern IT work experience (von Hellens, Nielsen & Beekhuyzen, 2003).

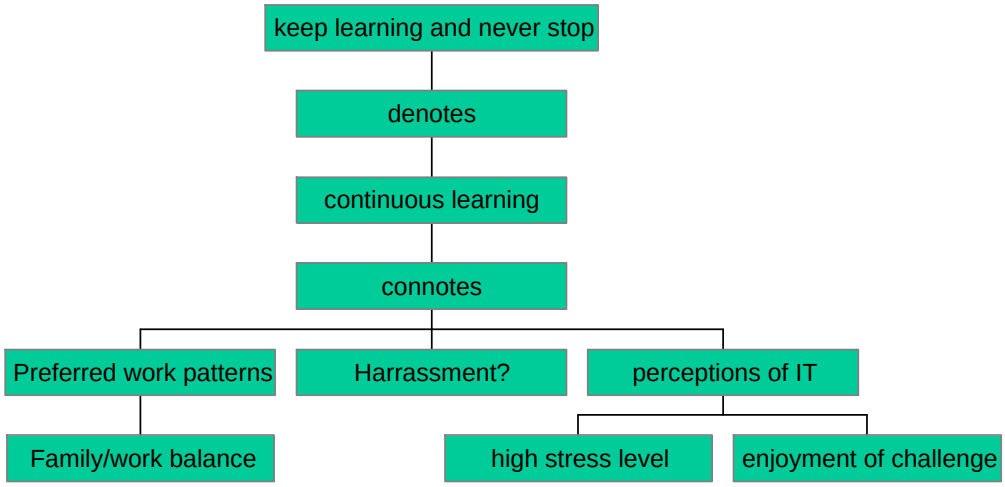

Figure 1. Denotation and Connotation

6 DIVIDED BY DUALISMS

Using the approach to discourse analysis outline above, we identified a distinctive discursive practice in the data set: that is the tendency to identify skills, attitudes and attributes, as mutually exclusive and strongly associated with gender. As mentioned earlier, these include attitudes to change, the ability to take a broad perspective and pay close attention to detail, and most strongly the incommensurability of technical and social skills, and the business/management and technical perspective (Nielsen, von Hellens, Beekhuyzen & Trauth, 2003). In this paper we illustrate this divide by considering the gendered division between 'soft' and 'hard' skills.

This discursive practice gave us cause to stop and reflect, since we have adopted Giddens' (1984) notion of the duality of structure as our framework for interpretation. In keeping with modern trends in sociology, Giddens rejected the notion of outright *dualism*, in which the fundamental forms of things are viewed as of two contrasting irreducible types (for example nature and nurture). Similarly, the discipline of linguistics has moved away from the position that conceptual definitions depend on identifying the 'other' or opposite concept. Critical approaches to discourse analysis recognise these oppositions as suppressive, marginalising or eliminating the 'inferior' part of the binary opposition. Writers in women's studies, such as Barrett (1992) have shown how the construction of such dualisms derives from prevailing social tendencies (such as the dualism between individual and society originating in the Enlightenment). The notion of dualism enables the promotion of one type of experience over the other so that dualisms often consist of unequal conceptual pairs, (such as active/passive, public/private) associated with gender and power (Porter, 1991). Research, which uses the inherent difference approach, discussed earlier, may be regarded in this light.

In other words, the dualisms may be viewed as social structures, which influence individual actions both in an enabling and constraining manner, but which over time may be reinforced, modified and transformed by individual actors.

6.1 The Dualism of 'Soft' and 'Hard' skills

"Women have really good communication skills and that's what's lacking in the IT industry" *(Sharon 84).*

This statement by Sharon represents the consensus of the interviewees and is reflected in much of the literature. As mentioned earlier, one stream of research in this area argues that IT would be improved by the skills, which women inherently possess. If we consider this dualism in relation to the professional and research context, we uncover a paradox. Soft skills are highly valued by employers and professional and industry organisations recommend that the relevant training be provided in undergraduate computer science and IT degrees. (Feeny & Willcocks, 1999) However most of the interviewees implied that such skills did not require training but are learned by women 'along the way'.

(Diane 216) "You can bring skills like communication and organisational. They're things that you can train yourself from a little child – your parents can help you with those. But things like technical skills … you would only get that at a tertiary institution".

However, what constitutes soft and hard skills is quite ambiguous. Although the interviewees represent communication and people skills as feminine attributes, they also discuss closely related skills as inherent male accomplishments.

(Joan 315) "I think we bring different qualities. Like men will get up and say what they think".

(Caroline 100) "Women are not good at talking about what they do and how they do it and their success. Women get down to doing the job and men talk about it".

Although good communication skills are considered important, not all the interviewees admired these 'masculine' qualities.

(Joan 169) "We tend to have a lot of males in our team and they tend to be very loud and .. yell over the top of each other .. and no one's heard you. I don't think you should have to be [more vocal]. I think that people should be courteous enough to shut up".

However, they indicated that they would need to learn how to behave in a similar way.

(Joan 315) "I'm learning to do that now. I have to be more vocal in meetings".

They also acknowledged that women might not be able to pick up such skills might not be picked up along the way, indicating that the social structures teach girls only particular types of communication skills (Pringle, von Hellens, Nielsen, Greenhill & Parfitt, 2000).

(Caroline 131-2) "My daughter goes to a single sex school and they encouraged the girls to .. be articulate about what they do. … men seem to pick it up through their relationships".

6.2 Dualisms and the Division of Labour

Most of the studies in the very large body of literature on the demand for IT skills take a positivist approach. However, from a structuration theory point of view, demand for IT skills cannot be treated as a matter of social fact, but is implicated in the structuration of the IT industry, and reinforced or challenged by industry participants. The distinction between soft and hard skills is reflected in the following example of the division of labour.

(*Sharon 84)* "If you've got all guys there, they [managers] like a girl to come in because she can facilitate communication better"

Despite the conflicting views on what constitutes good communication skills, the female ability to talk in a language, which will not "confuse the clients" (*Joan 304*) and the ability to assure "a job actually goes smoothly" are considered necessary. These skills are essential to successfully liaise, as "a boundary worker" between the company and the clients (*Barbara 70*).

The dualisms identified in the interview data reflect a traditional division of labour into hierarchies of skills, associated with gender, power and authority. For example, some interviewees reported being assigned to the more people oriented activities even when their performance in technical tasks was

satisfactory or even superior to some of their colleagues. This perception that they are being assigned to inferior work contradicts the frequently stated importance of soft skills. (Van Slyke, von Hellens, & Kittner, 2000; Van Slyke, von Hellens, Elder & Kittner, 2000)

(Joan 157) "There's this guy a couple of years younger than me. He doesn't have an IT degree. He would get a lot of what I call the hard stuff to do".

(Joan 157) "The secretaries up there are really bad [at getting down the technical requirements in the minutes of meetings] … then I just got stuck with the job … so next thing, I'm photocopying agendas".

These hierarchies of skills are reinforced through award systems and management evaluation criteria, which purport (claim) to be objective and equitable but, which "reflect entrenched managerial values" (Acker, 1990, p.149). Responsibility and complexity are defined according to existing social practices; hence the undervaluing of many feminised occupations such as nursing and child care which take responsibility for human lives but which are assumed not to require the same level of training as a profession requiring more 'hard' skills, such as medicine.

(April 62) "People don't want to rise up to that management role because they can't handle the people side. Because the industry pays a lot of money for just pure technology skills".

The gendering of IT work in this regard seems to have two consequences, as revealed in the interviews. It requires both men and women to 'adapt' to a masculinised domain, and it discourages many women and men from choosing IT as a field of study or career. Both the men and women interviewed indicated that they found the working arrangements and valuing of specific skill sets in the IT industry difficult.

7 INTERPRETIVE SCHEMES

The *dualisms* identified in the interview data, such as the dualism of 'hard' and 'soft' skills discussed above, may be viewed within structuration theory as the *interpretive schemes* through which signification is achieved. Interpretive schemes are "the stocks of knowledge that human actors draw upon in order to make sense of their own and others' actions"(Walsham & Han, 1990, p.54). Giddens' concept of interpretive schemes is useful in showing how these women deal with the contradictions in the way they conduct their daily working lives, "making that conduct appear rational, understandable and accountable to self and other"(Boland, 1996 p.693). Our interpretation of the interview data indicated that women achieve this by identifying themselves as 'different' from other women – able to learn to work like men and interested in areas that most women avoid.

(Kylie 176) "What makes me different .. knowing about new things which aren't traditionally for women… being able to go around in that area which has been long reserved for men".

In many cases this puts women on the other side of the 'divide'.

(Geraldine 181) "I guess that a lot of women who become programmers … don't like to speak to people".

However in most instances women are seen as combining both masculine and feminine qualities.

In structuration theory interpretive schemes are not immutable or monolithic. The meaning of particular expressions such as 'communication' needs to be interpreted within the social context. (Giddens, 1979) For example, many of the women interviewed identified networking skills as an instinctive skill at which men excel and which provides them with an advantage. Male networking is carried out not only formally but also informally through common/social interests such as sports, after work drinks sessions and so on, whereas women were more likely to go home after work and take on household and family duties. However, more recently women are developing networks through formal purposeful activities such as women in IT associations. One interviewee saw this as a means

for enabling women to utilise their natural assets, “It’s all sharing and giving and more so than with guys”.

However, in many cases women are resigned to participating in what they regard as ‘masculine’ activities, which they would usually avoid.

(Caroline 124) “I still feel uncomfortable when I go out with six men on a boat, big game fishing, but that’s what it takes”.

8 ROUTINISATION AND THE SEQUESTRATION OF EXPERIENCE

Using concepts from structuration theory as our interpretive framework, we view these discursive practices as providing ontological security through routinisation. The women interviewed expressed these dualisms in a taken for granted way. In structuration theory, the habitual, taken for granted nature of everyday activities is called routinisation; according to Giddens the “ the predominant form of day–to-day social activity … In the enactment of routines agents sustain a sense of ontological security” (1984, p282). Moreover, routine is “integral to the continuity of the personality of the agent … and to the institutions of society” (Giddens, 1984, p.60).

The unselfconscious reference to and representation of traditional *dualisms* allows women to operate without continual self-consciousness or anomie about the nature of the work. Durkheim's (1938) notion of anomie is discussed by Lehmann (1994) as relevant to women in modern society. Anomie may exist where there is a conflict between personal goals and the availability of structures to support those goals, or where there is uncertainty about organisational values. In an area such as IT, which is rapidly changing, and which presents its professional workforce with continual challenges (including the recent dot.com crashes) the need for the ontological security provided by routinisation would be particularly strong.

Although, these women consider that they possess key skills for the next millennium, it is not clear to what extent this constitutes the ‘sequestration’ of experience, which serves as a coping mechanism (Giddens, 1991) but which increases stress levels when events threaten the carefully constructed sense of identity.

One of the interviewees was distressed at the increasing ‘technologisation’ of the IT industry.

(April 62) “I can see a gap forming … because no one is going to be understanding what they need as opposed to what technology is doing at the moment. Technology is overruling. It’s a terrible thing”.

The alienation of a large population group – the underepresentation of women and minorities in the IT industry can lead to what Giddens call “internally referential systems” (Giddens, 1991, p.150). This does not mean that such systems are free from internal conflicts. However, even these conflicts are “organised in terms of system principles... rather than in relation to extrinsic criteria or demands” (Giddens, 1991, p.150). As such systems extend their domain of influence they can increasingly ignore the demands of the wider community. In this light, the rejection of IT as a career option, particularly at the undergraduate point of entry indicates that the IT industry provides negative images for both young men and women contemplating their career choices.

9 RESEARCH ISSUES

Our use of structuration theory has revealed other problems in studying female participation in the IT industry. To understand the production and reproduction of social structure requires a longitudinal study but the rapid rate of change in the industry including high staff turnover make this difficult. Without a longitudinal study it is difficult to identify how individual agents reinforce, modify or transform institutionalised traditions within the IT industry.

The role of individual women in reinforcing, modifying and transforming the social structures is therefore difficult to identify. In order to understand better how women help configure the institutional realm of IT work, we propose that more qualitative studies of women at work in IT as well as women talking about IT are needed. It is suggested that a 'proper' application of structuration theory would require a longitudinal study. Due to the dynamic nature of the IT industry (unlike other, more traditional industries), a longitudinal study could give greater insight into perceptions of women in IT over time,

A deeper understanding of the individual situations of people studying and working in the ICT industry is needed to gain a better view of the challenges that women face. In order to enable insight into how domination and legitimation occurs through the use of power and sanctions, observations of IT individuals will be conducted in the next phase of the project to extend the analysis of the discourse.

10 THE DISCURSIVE DIVIDE

According to Lemke (1995) discourse analysis is most useful when examining a particular community in depth and when contextual information can be taken into account. "For this reason, longitudinal designs or case studies are well suited for discourse analysis methods. Here we learn a great deal about a particular class, seeing repeated patterns within the data and a variety of strategies which create variations on those patterns."

This paper argues that the use of discourse analysis and the perspective of structuration theory, reveals that women's participation in the IT industry is discursively constructed, and that this discourse is strongly characterised by dualisms which divide men from women, and masculine from feminine, as illustrated in the discussion of 'soft' and 'hard' skills. The dualisms provide the interviewees with interpretive schemes through which they can interpret and make sense of their working lives; that is, in order to feel comfortable in the IT industry women represent themselves as 'different' from most women, in their work roles and professional interests at least. We also argue that these divisions simplify and misrepresent the complexity of women's work in the IT industry.

Although these discursive practices may offer some sense of ontological security to the women interviewed, the fact that female participation in IT continues to decline indicates that young women are not attracted in large numbers to this new female identity. The formation and maintenance of female identity in the IT industry and the continuing 'masculinisation' of the industry have serious social, commercial and equity implications and will continue to be investigated.

Since IT degrees do not attract large numbers of high achieving students there is some indication that these divisions also make the industry less attractive to males. Other factors that may contribute to declining enrolments in IT degrees such as the IT field perceived as lacking of social interaction and not supporting the development of collaborative and reflective skills appropriate for a learning organization (Van Slyke, von Hellens & Kittner, 2000; Nielsen, von Hellens, Pringle & Greenhill, 1999).

11 ACKNOWLEDGEMENTS

The authors gratefully acknowledge financial support from the Australian Research Council Large Grants scheme, which funded the collection of the interview data by the first two authors and Professor Eileen Trauth. The authors thank Professor Trauth for her collaboration with the WinIT project and for allowing access to her interview data. The authors also thank the anonymous reviewers who raised many important issues for this research that are unable to be discussed in a paper of this length. These issues will be followed up in future research.

References

Acker, J. (1990). Hierarchies, jobs, bodies: a theory of gendered organisations. Gender and Society, 4(2): 139-158.

Barrett, M. (1992). Words and things: materialism and method in contemporary feminist analysis. Destabislising theory: contemporary feminist debates. M. A. Barrett and A. Phillips. Cambridge, Polity Press.

Beekhuyzen, J.P., Nielsen, S.H. & von Hellens, L.A. (2003) Challenging the dualisms in female perceptions of IT work. The Australian Journal of Information Systems, 10 (2), pp.105-114. 'Best Paper' in the Conference on Australian Women in IT (AusWIT03).

Boland, R. J. (1996). Why shared meanings have no place in structuration theory: a reply to Scapens and Macintosh. Accounting, Organizations and Society 21(7/8): 691-697 Copenhagen, Denmark.

Brosnan, M.J. & Davidson, M.J. (1996) Psychological gender issues in computing. Gender, Work and Organization, January 1996, 3(1): 13-25.

Camp, T (1997) The Incredible Shrinking Pipeline Communications of the ACM 40 (10): 103-110.

Dilthey, W. (1976). Selected writings. London: Cambridge University Press.

Durkheim, E (1938) The Division of Labour, Glencoe, Ill., Free Press.

Eco, U. (1984). Semiotics and the philosophy of language. Bloomington: Indiana University Press.

Fairclough, N. (1992) Discourse and social change. Cambridge: Polity Press.

Fairclough, N. (1997). Conversationalization of public discourse and the consumer. In R. Keat, N. Whiteley, & N. Abercrombie (Eds.), The authority of the consumer (pp. 253-268). London: Routledge.

Feeny, D., and Willcocks, L.P. (1999) Rethinking skills and capabilities in the information systems function. In W.L.Currie and B.Galliers, eds. Rethinking Management Information Systems, Oxford, OUP.

Foucault, M. (1969) The Archaeology of Knowledge, London, Tavistock.

Giddens, A. (1991) Modernity and self identity: self and society in the late modern age. Cambridge, Polity Press.

Giddens, A. (1984) The constitution of society: Outline of the theory of structuration, Cambridge, Polity Press

Giddens, A. (1979). Central problems in social theory. Berkeley, University of California Press

Halford, S. & Leonard, P. (2001) Gender. Power and organisations. N.Y. Palgrave.

Jones, M. R. (1999) Structuration theory Rethinking management information systems. In W. J. Currie & R. Galliers, Rethinking management information systems, Oxford, Oxford University Press**:** 103-135.

Klein, H. & Myers, M. (1999) A set of principles for conducting and evaluating interpretive field studies in information systems. MIS Quarterly, 23(1), 67-94

Kress, G. (1985). Discourse, texts, readers and the pro-nuclear arguments. In P. Chilton (Ed.), *Language and the nuclear debate* (pp. 65-87). London: Frances Pinter.

Kvasny, L. & E.M. Trauth (2003) The Digital Divide at Work and Home: the discourse about power and underrepresented groups in the information society. In E.H.Wynn, E.A.Whitley, M.D.Myers, and J.I.Degross (eds) *Global and Organizational Discourse about Information Technology*. Boston, Kluwer Academic Publishers, pp. 273-291.

Lehmann, J. M. (1994) Durkheim and Women. Lincoln, Nebr., Nebraska University Press.

Lemke, J.L. (1995) Textual Politics, Discourse and Social Dynamics, Taylor & Francis, London.

Macey, D. (2000) The Penguin Dictionary of Critical Theory. Penguin Books, England.

Megalogenis, G. (2003) Women (not) on top. The Weekend Australian, April 26-27, p.17.

Meredyth, D. et al, (1999) Real Time: Computers, Change and Schooling; National Sample Study of the IT Skills of Australian School Students, a project funded by the Commonwealth Department of Education, Training and Youth Affairs. Available at http://www.detya.gov.au/archive/schools/Publications/1999/realtime.pdf.

Nielsen, S.H., von Hellens, L., Beekhuyzen, J. & Trauth, E. (2003) Women talking about IT work: Duality or dualism? Proceedings of the ACM SIGCPR/SIGMIS, Philadelphia, Pennsylvania, USA, April 2003, pp.68-74.

Nielsen, S.H., von Hellens, L.A., Pringle. R. & Greenhill, A. (1999) Students' perceptions of information technology careers. Conceptualising the influence of cultural and gender factors for IT education" (1999), GATES, Vol.5, Issue 1, 1999: 30-38.

Pringle, R., von Hellens, L.A., Nielsen, S.H., Greenhill, A. & Parfitt, L. (2000) Net Gains: Success Strategies of Professional Women in Information Technology. Proceedings of the IFIP TC 9.1 Conference on Women, Work and Computerization: Charting a Course to the Future, Vancouver, Canada, June 2000, pp.26-33.

Patton, M.Q. (1990) Qualitative evaluation and research methods, 2nd ed. Newbury Park, Sage

Porter, E. (1991). Women and moral identity. Sydney, Allen and Unwin.

QSR (1997). QSR NUD*IST 4: User Guide. Melbourne, Sage Publications.

Spender, D. (1995) Nattering on the Net; women, power and cyberspace, Spinifex Press, North Melbourne.

Trauth E. M., Nielsen, S. H. & von Hellens, L. A. (2003) Explaining the IT Gender Gap: Australian Stories for the New Millennium. Journal of Research and Practice in Information Technology, Vol. 35, No. 1, February 2003: 7-20.

Trauth, E.M. (2002) Odd Girl Out: an individual differences perspective on women in the IT profession. Information Technology and People, 5(2), pp.98-118.

Van Slyke, C., von Hellens, L. & Kittner, M. (2000) A Comparison of Australian and American Students' Perceptions of IT Job Skills. Proceedings of the 2000 Information Resources Management Association (IRMA) International Conference, Anchorage, USA, May 2000.

Van Slyke, C., von Hellens L., Elder, K. & M. Kittner (2000) Comparing the Importance of IT job Skills in Australia and the United States. Proceedings of the 15th annual IAIM conference, Brisbane, 8-10 December 2000.

Venkatesh, V., Morris, M.G. & Ackerman, A.L. (2000). A longitudinal field investigation of gender differences in individual technology adoption in decision-making processes. Organizational Behavior and Human Decision Processes (83): 33-60.

Venkatesh, V. and Morris, M. (2000) Why Don't Men Ever Stop to Ask for Directions? Gender, Social Influence, and their Role in Technology Acceptance and Usage Behavior, MIS Quarterly (24:1), 2000, pp. 15-140.

von Hellens, L., Nielsen, S. H. and Beekhuyzen, J. P. (2004) An exploration of the dualisms in the female perceptions of IT work. Journal of Information Technology Education, Vol 3, pp103-116.

von Hellens, L. A. & Nielsen, S. H. & Beekhuyzen J.P. (2003) Women Working in the IT Industry: Challenges for the New Millennium. Journal of Business and Economics Research, 1(11), pp.21-32.

von Hellens, L.A. & Nielsen, S.H. (2001) Australian women in IT. Communications of the ACM, 44 (7), pp.46-52.

Wajcman, J (1991) Feminism confronts technology, Polity Press.

Walsham, G. & Han, C.K. (1990). Structuration theory and information systems research. International Conference on Information Systems.

Wynn, E.H., Whitely, E.A., Myers, M.D., and DeGross, J.I. (2003) Global and Organizational Discourse about Information Technology: IFIP TC8/WG 8.2 Conference on Global and Organizational Discourse about Information Technology, December 12-14, 2002, Barcelona, Spain. Boston, Kluwer Academic Publishers.